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(P1)

Conductive materials affect methanogenic activity of pure cultures of methanogens and syntrophic cocultures

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Conductive carbon materials have been reported as facilitators in direct interspecies electron transfer (DIET) in cocultures of electroactive bacteria (e.g., *Geobacter. metallireducens*) and methanogens (e.g., *Methanosaeta harundinacea* [1, 2] or *Methanosarcina barkeri* [3]) thus accelerating the methane production rate (MPR). Carbon nanotubes (CNT) also improved the MPR by pure cultures of methanogens up to 17 fold [4].

In this study, pure cultures of *Methanobacterium formicicum* (growing on H_2/CO_2) and a co-culture of *Syntrophomonas zehnderi* and *M. formicicum* (growing syntrophically on oleate), were incubated with different fully characterized conductive materials (CNT, CNT with 2% of iron – CNT@2%Fe, activated carbon – AC and magnetite).

The initial MPR increased by 9, 11 and 14 times with 5 g/L CNT@2%Fe, 5 g/L CNT and 1 g/L AC respectively, comparing to the controls. The syntrophic coculture converted oleate to methane in 17 days with 0.1 g/L AC, whereas in the control assay it lasted 27 days. Magnetite inhibited the methane production in all assays.

The mechanisms behind these observations are still unknown, are beyond DIET, are relevant to be considered in the field of electromicrobiology and deserve to be further explored.

References

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